SOUTHERN NEVADA REGIONAL PLANNING COALITION

Regional Emissions Inventory

Greenhouse Gas Emissions (2005 -2009)

Reported By: Sustainability Sub Committee

1/3/2011

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Introduction

The Southern Nevada Regional Planning Coalition's (SNRPC) mission is to bring together all public jurisdictions to coordinate regional planning in a seamless fashion while respecting each member's autonomy. For the purpose of this greenhouse gas emissions inventory, SNRPC provided the opportunity to develop a consistent protocol for reporting greenhouse gas emissions while respecting each member agency's autonomy to establish independent reduction strategies and targets. SNRPC assisted member agencies with dues for memberships to ICLEI-Local Governments for Sustainability USA (ICLEI-USA), a membership association of more than 600 U.S. local governments committed to climate protection and sustainability. ICLEI-USA is a leader in greenhouse gas emissions reporting and provides a wide array of tools to assist SNRPC member agencies in developing a uniform reporting protocol for this and future greenhouse gas emission inventories. The following inventory is the first greenhouse gas emission inventory for the Las Vegas Valley and includes the following jurisdictions: unincorporated Clark County, the Cities of Las Vegas, North Las Vegas, Henderson, and Boulder City.

Background[i]

Energy from the Sun drives the Earth's weather and climate. The Earth absorbs energy from the Sun, and also radiates energy back into space. However, much of this energy going back to space is absorbed by "greenhouse" gases in the atmosphere (see Figure 1 of Greenhouse Effect). Because the atmosphere then radiates most of this energy back to the Earth's surface, our planet is warmer than it would be if the atmosphere did not contain these gases. Without this natural "greenhouse effect," temperatures would be about 60ºF lower than they are now, and life as we know it today would not be possible.

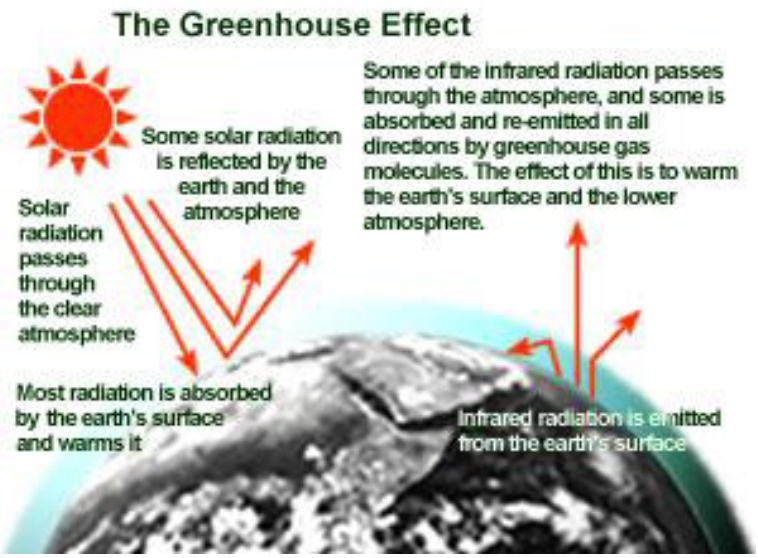


Figure 1: The Greenhouse Effect

During the past century, humans have substantially added to the amount of greenhouse gases in the atmosphere by burning fossil fuels such as coal, natural gas, oil and gasoline to power our cars, factories, utilities and appliances. Greenhouse gas emissions were tracked based on the inputs into the Clean Air & Climate Protection (CACP) software. The software is designed to take different inputs (such as kilowatt-hours, therms, & vehicle miles traveled) and converts the inputs into a final output - Equivalent Carbon Dioxide (E-CO_2 or CO_2e)[ii]. The E-CO_2 is used to compare various measures and data sources in one standardized format, and has become a national standard for reporting emission inventories.

Recent Climate Change[iii]

According to the United Nation's Intergovernmental Panel on Climate Change (IPCC) 2007 report, since the Industrial Revolution (around 1750), human activities have substantially added to the amount of heat-trapping greenhouse gases in the atmosphere. The burning of fossil fuels and biomass (living matter such as vegetation) has also resulted in emissions of aerosols that absorb and emit heat, and reflect light. The addition of greenhouse gases and aerosols has changed the composition of the atmosphere. The changes in the atmosphere have likely influenced temperature, precipitation, storms and sea levels. However, these features of the climate also vary naturally, so determining what fraction of climate changes are due to natural variability versus human activities is challenging.

Performing inventories provides an "added value" regardless of whether or not someone subscribes to the IPCC's research, or research that indicates Climate Change is a major global threat. The exercise in gathering and analyzing the various data sources allows agencies to identify inefficiencies in operations and provides a unique opportunity to track energy use, waste processes, and water consumption (among others) at the government operations, jurisdictional boundary, and regional levels.

Greenhouse Gas Protocols

Protocols advance the consistent, comparable, and relevant quantification of emissions and appropriate, transparent and policy-relevant reporting of emissions. Emission reporting is a new field and protocols are constantly evolving. This and future inventories will be developed using the Local Government Operations Protocol – for the quantification and reporting of greenhouse gas emission inventories (Version 1.0) from September 2008. The protocol was developed in partnership by: California Air Resources Board, California Climate Action Registry, ICLEI – Local Governments for Sustainability USA (ICLEI-USA), and The Climate Registry.

ICLEI-USA was launched in 1995 and has grown from a handful of local governments participating in a pilot project to a solid network of more than 600 cities, towns and counties actively striving to achieve tangible reductions in greenhouse gas emissions and create more sustainable communities. ICLEI-USA is the domestic leader on climate protection and adaptation, and sustainable development at the local government level.

Updates and Revisions

The Regional Greenhouse Gas Emissions Inventory will be updated on a biennial basis, based on the availability of data from NV Energy, Southwest Gas, Nevada Department of Transportation (NDOT), Regional Transportation Commission (RTC), Southern Nevada Health District (SNHD), and the Nevada Department of Environmental Protection (NDEP). Emission reporting is a new field and revisions to both the emission protocol and the greenhouse gas emission inventory are common, and should be expected as measures are revised and new measures are added.

ICLEI's Five Milestone Methodology[iv]

SNRPC paid for memberships during the 2009 work year for interested agencies so they would have access to the same software tools, protocol, and methodology for conducting greenhouse gas emission modeling. ICLEI's Milestones Methodology was developed to provide guidance for agencies as they learn to navigate the modeling process.

1. **Conduct a baseline emissions inventory and forecast**
   The local government first calculates greenhouse gas emissions for a base year (e.g., 2000) and for a forecast year (e.g., 2015). The calculations capture emissions levels from all municipal operations (e.g., local government owned and/or operated buildings, streetlights, transit systems, wastewater treatment facilities) and from all community-related activities (e.g., residential and commercial buildings, motor vehicles, waste streams, industry). This inventory and forecast provides a benchmark for planning and monitoring progress.

2. **Adopt an emissions reduction target for the forecast year**
   The local government passes a resolution establishing an emission reduction target for the local government. This target, which is essential, fosters political will and creates a framework that guides the planning and implementation of measures.

3. **Develop a Local Climate Action Plan**
   The local government then develops a Local Climate Action Plan, ideally with robust public input from all stakeholders. The plan details the policies and measures that the local government will take to reduce greenhouse gas emissions and achieve its emissions reduction target. Most plans include a timeline, a description of financing mechanisms, and an assignment of responsibility to departments and staff. In addition to direct greenhouse gas reduction measures, most plans also incorporate public awareness and education efforts.

4. **Implement policies and measures**
   The local government implements the policies and measures contained in their Local Climate Action Plan. Typical policies and measures include energy efficiency improvements to municipal buildings and water treatment facilities, streetlight retrofits, public transit improvements, installation of renewable power applications, and methane recovery from waste management.

5. **Monitor and verify results**
   Monitoring and verifying progress on the implementation of measures to reduce or avoid greenhouse gas emissions is an ongoing process. Monitoring begins once measures are implemented and continues for the life of the measures, providing important feedback that can be used to improve the measures over time. ICLEI's software provides a uniform methodology for local government to report on measures.

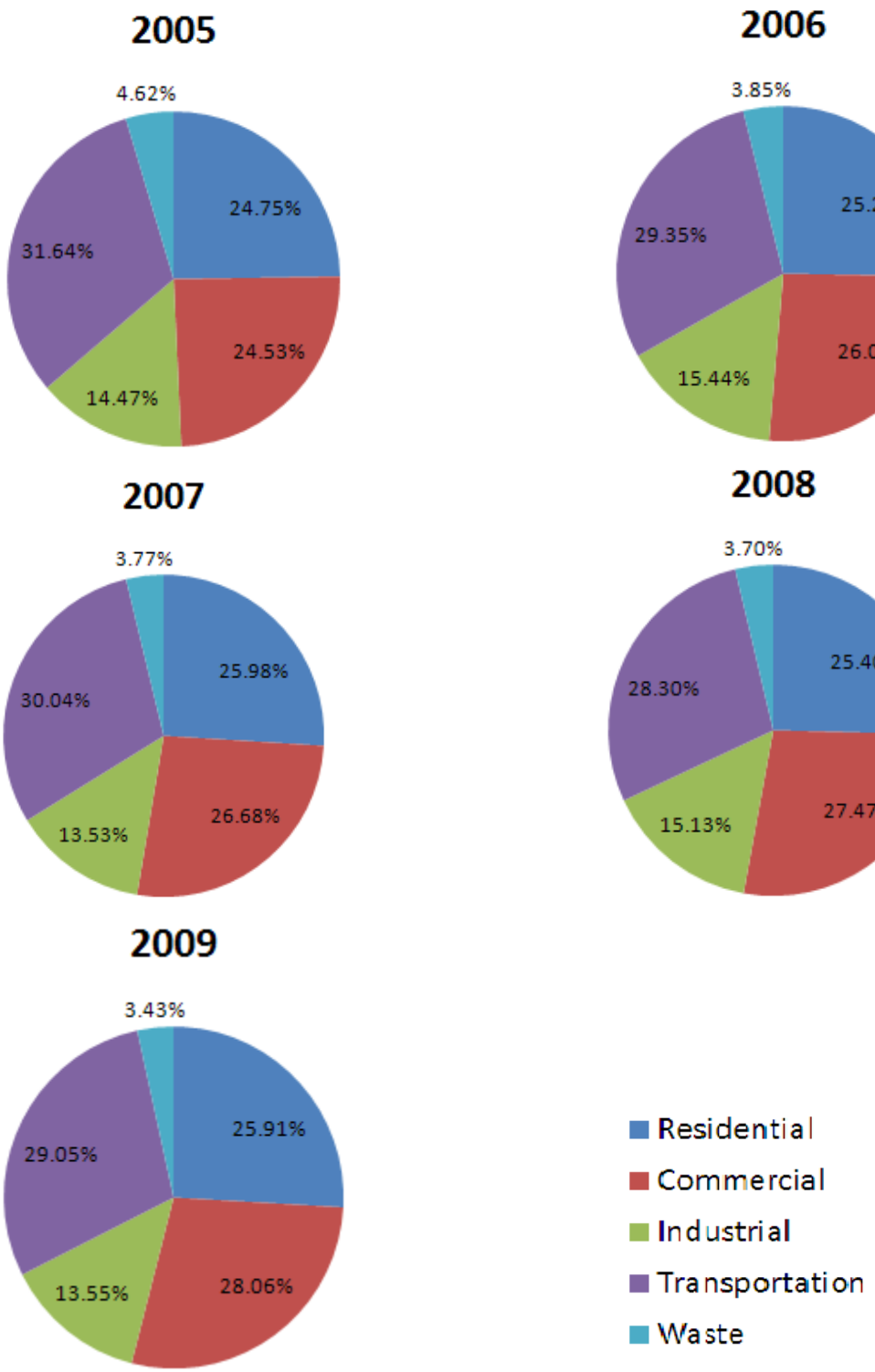
Community Base Year

A meaningful and consistent comparison of emissions over time requires that reporting agencies set a base year with which to compare current emissions. Prior to beginning data collection, the SNRPC Sustainability Sub-committee met with local utilities and examined the range of data sources available and selected 2005 as the base year due to the availability of accurate records for key emission sources in sufficient detail to conduct an inventory.

2005 – 2009 Comparison: Percentage by Sector

The following page shows a comparison of emissions by sector across the five years of the inventory. The percent of total emissions (for each sector) does not change significantly from year to year, even though the total emissions fluctuate annually. Another trend is that the emissions from transportation is consistently one-third of the total emissions in the Las Vegas Valley, according to the output from ICLEI's Transportation Assistant that was utilized to model vehicle miles traveled (VMT).

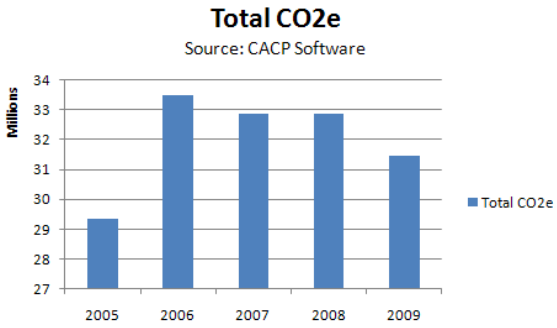
2005 – 2009 Comparison: Percent Emissions by Sector



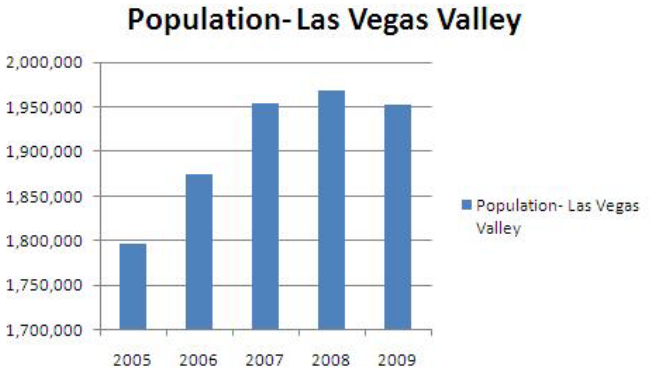
Equivalent Carbon Dioxide (E-CO2)

CO2e percentage per sector										
	2005		2006		2007		2008		2009	
Residential	6,938,768	24.75%	8,152,680	25.28%	8,230,316	25.98%	8,053,002	25.40%	7,885,981	25.91%
Commercial	6,877,364	24.53%	8,414,735	26.09%	8,453,688	26.68%	8,707,517	27.47%	8,538,580	28.06%
Industrial	4,056,220	14.47%	4,979,459	15.44%	4,287,828	13.53%	4,796,469	15.13%	4,122,414	13.55%
Transportation	8,870,378	31.64%	9,466,314	29.35%	9,518,080	30.04%	8,969,962	28.30%	8,842,226	29.05%
Waste	1,296,808	4.62%	1,241,028	3.85%	1,193,689	3.77%	1,171,889	3.70%	1,043,642	3.43%
Total	**28,039,537**		**32,254,215**		**31,683,600**		**31,698,840**		**30,432,843**	

Greenhouse gas emissions increased with a strong economy (2005 – 2006), but as the economic conditions began to change in 2007 (higher gas prices & increased foreclosures), total emissions began to decline and continued declining through 2008. One exception to the trend is found in the industrial sector (see table above), which includes transportation gas, a variable that changes greatly from year to year and makes up more than 75% of the sector. Transportation gas is defined in greater detail in the Emission Sectors section of this report.



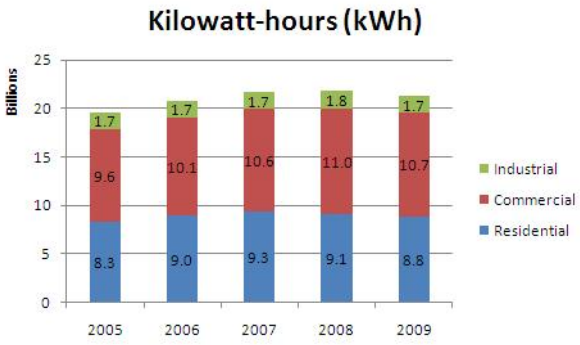
Overall, identifying specific reasons for changes in E-CO_2 becomes more speculative due to the large number of variables in any one sector. For instance, is the change in the residential sector from 2007 – 2008 due to citizen conservation efforts, a decrease in the Valley's population or did the change occur from a decline in the number of visitors traveling to Las Vegas? Or is it a combination of all of these variables in addition to many others not mentioned above?



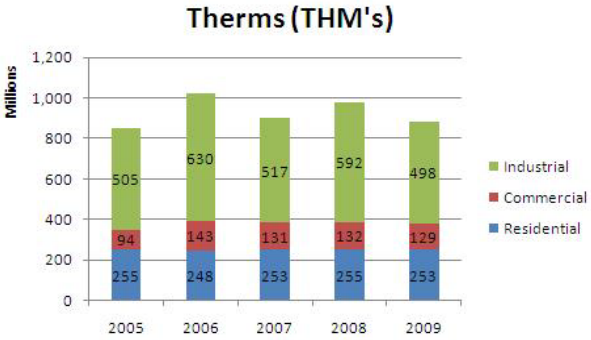
Emission Sectors

Within each sector, total energy consumption and emissions from Southern Nevada utilities was input and reported for all sectors, including data from NV Energy for electricity (in kilowatt-hours) and Southwest Gas for natural gas (in therms). All figures represent total consumption over each utility's Clark County service territory, excluding Mesquite, Moapa Valley, Laughlin, and Searchlight.

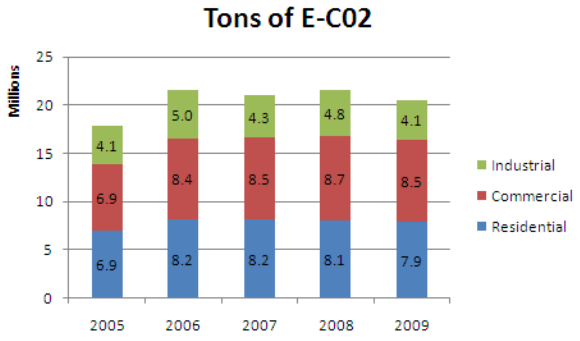
- ***Residential sector*** – consists of single and multi-family housing.



- ***Commercial sector*** – consists of general and large commercial activities. In addition, this sector contains municipal government operations and streetlights, which substantially increase the size of this sector.

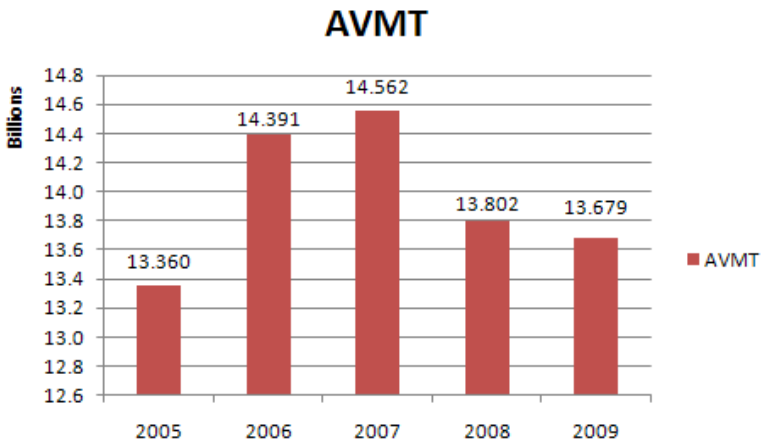


- ***Industrial sector*** – consists of the largest industrial, distribution, and manufacturing. In addition, the industrial sector also contains "transportation gas." Transportation gas is bulk gas purchased by a large end-user from a wholesaler and transported to the end-user using Southwest Gas' pipeline. Transportation gas averages to be 60% of the total natural gas consumed in the Las Vegas Valley over this period. A portion of transportation gas delivered is used in the production of electricity.



Transportation (Clark County)

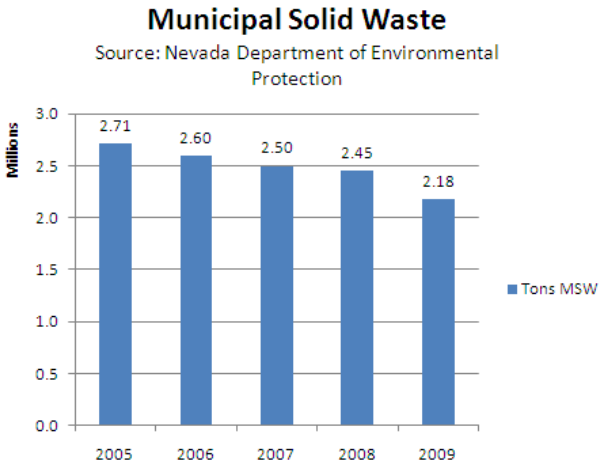
The Nevada Department of Transportation (NDOT) Annual Vehicle Miles of Travel Reports was the source utilized for VMT data. NDOT's publication provides researchers a ready reference for Annual Vehicle Miles of Travel (AVMT) used for a multitude of applications. AVMT is calculated by multiplying the Annual Average Daily Traffic (AADT) by the roadway segment length, and then multiplying this figure by 365 to produce "segment" AVMT. Segment AVMT for a route or other category is then summed to calculate a category total.



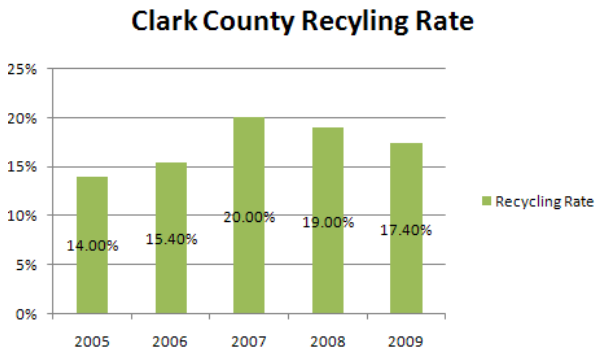
Most notably, the resulting trends correlate with population and visitation data, which indicates fewer miles driven. NDOT's data shows an upward trend in VMT until 2008, when VMT begins a sharp decline. Possible explanations include the global economic recession and an increase in fuel prices in Nevada in 2008, which corresponded with the Regional Transportation Commission of Southern Nevada's (RTC) record public transportation monthly ridership of 6.15 million passengers.

Waste (Clark County)

The Southern Nevada Health District (SNHD) is responsible for collecting data to calculate the Municipal Solid Waste (MSW) and recycling rates for Clark County. These reports are submitted to the Nevada Division of Environmental Protection (NDEP) and reported out on a State-wide basis, by County. Reports for several years including 2007 & 2008 are available on the NDEP website. The MSW and recycling rates for Clark County are based on data submitted to the Southern Nevada Health District by the Commercial and Industrial sectors on a voluntary basis, so the data may not accurately reflect the actual recycling rates if a business fails to report its recycling efforts (for instance: materials are transferred out of state).



For the purpose of this report it should be assumed that "municipality" is referring to Clark County. These figures are for the entire County, including outlying areas such as Mesquite and Laughlin, which are not factored in the residential, commercial and industrial sectors. The total Municipal Solid Waste (MSW) is the sum of recycled MSW plus the quantity of MSW disposed of in a landfill, which was reported as generated in the municipality.



The trend for waste disposed on in landfills appears to be trending in the right direction, declining in five years of analysis. Recycling rates for the Valley declined a little in 2008 after trending up for the three previous years.

Brookings Institute

In an effort to quantify the results of this inventory and establish where the Las Vegas regional inventory falls nationally, research from the Brookings Institute (published May 2008) was included. "Shrinking the Carbon Footprint of Metropolitan American"[v] quantifies transportation and residential carbon emissions for the 100 largest U.S. metropolitan areas (see appendix – top 50) for our regional base year (2005). The research found that metro area residents have smaller carbon footprints than the average American, although metro footprints vary widely. The Las Vegas-Paradise region ranked well when transportation and residential energy were combined, but not so well when per capita carbon emissions from Residential Energy Use was evaluated independently from transportation.

Table A1 – Per Capita Carbon Emissions from Transportation and Residential Energy Use, 2005

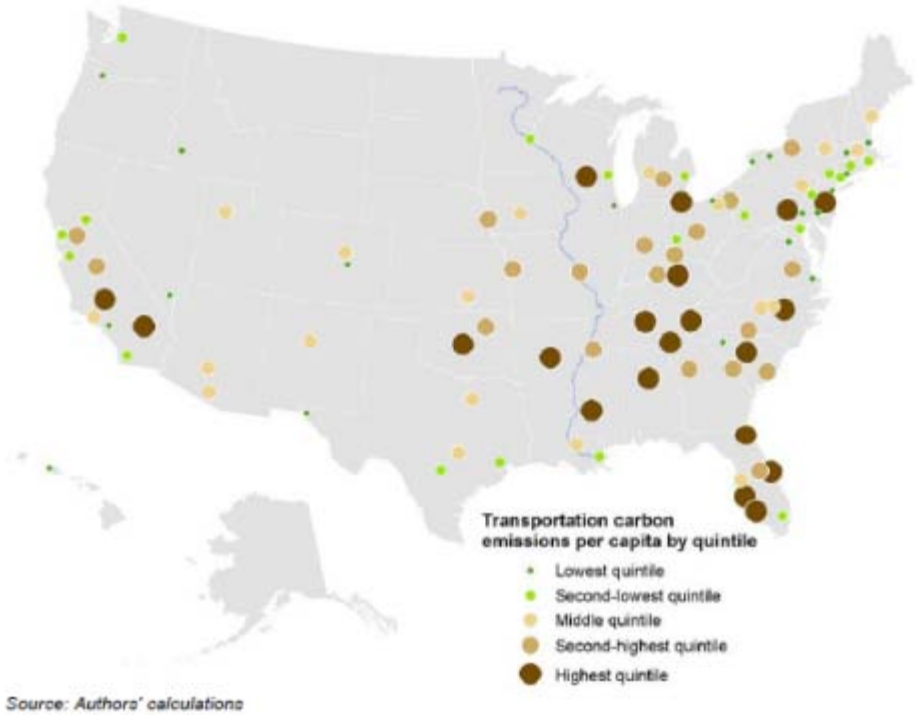
- **Las Vegas-Paradise, NV**
  - Ranked 18th/100 2.013 Metric tons/resident

Table A2 – Per Capita Carbon Emissions from Transportation, 2005

- **Las Vegas-Paradise, NV**

Measure	Rank	Carbon Emissions
Highway	(9th/100)	1.032
Auto rank	(12th/100)	.845
Truck rank	(13th/100)	.186

FIGURE A1
Per Capita Carbon Emissions from Transportation, 2005 (metric tons)



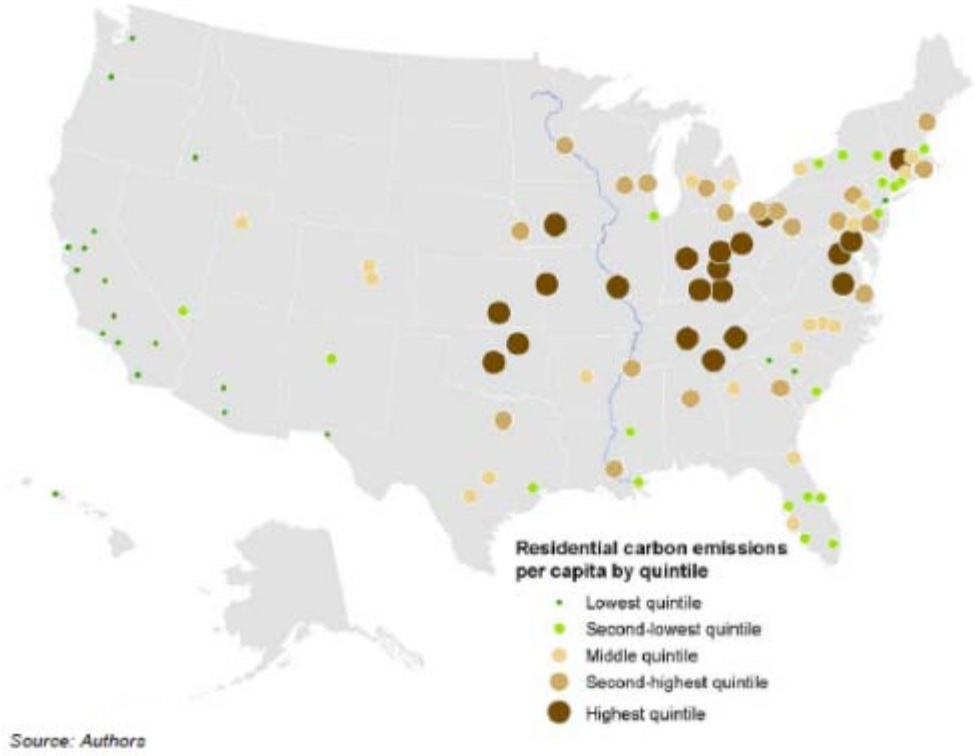
Source: Authors' calculations

Table A3 – Per Capita Emissions from Residential Energy Use, 2005

- **Las Vegas-Paradise, NV**

Rank	Residential Total Metric Tons	Residential Electricity Metric Tons	Other Residential Fuels Metric Tons
33	.981	.755	.227

FIGURE A2
Per Capita Carbon Emissions from Residential Energy Use, 2005 (metric tons)



Source: Authors

The Brookings Institute research was provided to illustrate how the Las Vegas Valley ranks nationally. There are several limitations to this study which are described in the Brookings Institute report. A web link is provided to the original report in the reference section of this report. The purpose of the Brookings Institute report was to highlight five policies that should be important to all metro areas and the nation as a whole: (1) Promote more transportation choices; (2) Introduce more energy-efficient freight operations; (3) Require home energy cost disclosure when selling and "on-bill" financing; (4) Use federal housing policy; and (5) Issue a metropolitan challenge to develop innovative solutions.

Reduction Strategies

SNRPC member agencies are working on reduction strategies to lower emissions from their government operations and throughout their jurisdictions. Additional information is available from their websites:

SNRPC Member Agencies:

- Clark County: http://www.accessclarkcounty.com/depts/clark_county/Eco/Pages/default.aspx
- City of Henderson: http://www.cityofhenderson.com/sustainability/index.php
- City of Las Vegas: http://www.lasvegasnevada.gov/sustaininglasvegas/
- City of North Las Vegas: http://www.cityofnorthlasvegas.com/
- City of Boulder City: http://www.bcnv.org/conservation/
- Clark County School District: http://ccsd.net/facilities/energy_management/energy.htm

Regional Agencies and Utilities:

- NV Energy: http://www.nvenergy.com/renewablesenvironment/
- Southwest Gas: http://www.swgas.com/efficiency/nv/index.php
- Southern Nevada Health District: http://www.southernnevadahealthdistrict.org/
- Regional Transportation Commission: http://www.rtcsnv.com/about/sustainability/index.cfm
- Southern Nevada Water Authority: http://www.snwa.com/html/about_sustainability_projects.html

In addition, several Southern Nevada agencies have partnered together to create new community programs such as HomeFree Nevada and Green Chips. HomeFree Nevada is Nevada's first Home Performance with ENERGY STAR® program that offers a comprehensive and quantitative, whole-house approach to improving energy efficiency, comfort, health, safety and durability of homes, while helping to protect the environment. Green Chips is a public-private partnership, which encourages environmental sustainability initiatives in Southern Nevada. In response to the needs of global environment, Green Chips is helping local residents and businesses to take real steps to reduce environmental impacts in the Las Vegas Valley. For more information about either program, please visit their website:

HomeFree Nevada: http://www.homefreenevada.org/ or **Green Chips**: http://www.greenchips.org/index.html

References:

Photo Credit:
Las Vegas Strip Photo (Header) is from:
http://weblogs.sun-sentinel.com/news/politics/dcblog/2009/08/aarp_heading_to_vegas.html

[i] Background on Climate Change Science taken from Environmental Protection Agency's (EPA's) website (on March 29, 2010): http://www.epa.gov/climatechange/science/index.html

[ii] Definition of Equivalent Carbon Dioxide (E-CO2) is from the Intergovernmental Panel on Climate Change – Working Group 1: The Physical Science Basis:
http://www.ipcc.ch/publications_and_data/ar4/wg1/en/annex1sglossary-e-o.html
The amount of carbon dioxide emission that would cause the same integrated radiative forcing, over a given time horizon, as an emitted amount of well mixed greenhouse gas. The equivalent carbon dioxide emission is obtained by multiplying the emission of well mixed greenhouse gas by its Global Warning Potential for the given time horizon. A mix of greenhouse gases is obtained by summing the equivalent carbon dioxide emissions of each gas. Equivalent carbon dioxide emission is a standard and useful metric for comparing emission of different greenhouse gases but does not imply exact equivalence of the corresponding climate change response.

[iii] Recent Climate Change section taken from the EPA's website (on March 29, 2010): (http://www.epa.gov/climatechange/science/recentcc.html) – it should be noted that both Background and Recent Climate Changes sections also reference the Intergovernmental Panel on Climate Change (IPCC).

[iv] ICLEI Local Government for Sustainability – Five Milestone Process was taken from (March 29, 2010): http://www.iclei.org/index.php?id=810

APPENDIX A: CARBON FOOTPRINT RESULTS FOR 100 METROPOLITAN AREAS

TABLE A1
Per Capita Carbon Emissions from Transportation and Residential Energy Use, 2005

Metropolitan Area	Rank	Carbon Footprint (metric tons)
Honolulu, HI	1	1.356
Los Angeles-Long Beach-Santa Ana, CA	2	1.413
Portland-Vancouver-Beaverton, OR-WA	3	1.446
New York-Northern New Jersey-Long Island, NY-NJ-PA	4	1.495
Boise City-Nampa, ID	5	1.507
Seattle-Tacoma-Bellevue, WA	6	1.556
San Jose-Sunnyvale-Santa Clara, CA	7	1.573
San Francisco-Oakland-Fremont, CA	8	1.585
El Paso, TX	9	1.613
San Diego-Carlsbad-San Marcos, CA	10	1.630
Oxnard-Thousand Oaks-Ventura, CA	11	1.754
Sacramento--Arden-Arcade--Roseville, CA	12	1.768
Greenville, SC	13	1.859
Rochester, NY	14	1.908
Chicago-Naperville-Joliet, IL-IN-WI	15	1.965
Buffalo-Niagara Falls, NY	16	1.995
Tucson, AZ	17	2.000
Las Vegas-Paradise, NV	18	2.013
Stockton, CA	19	2.016
Boston-Cambridge-Quincy, MA-NH	20	2.024
Phoenix-Mesa-Scottsdale, AZ	21	2.072
Fresno, CA	22	2.076
Lancaster, PA	23	2.091
New Haven-Milford, CT	24	2.097
Poughkeepsie-Newburgh-Middletown, NY	25	2.133
Colorado Springs, CO	26	2.134
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	27	2.137
Miami-Fort Lauderdale-Miami Beach, FL	28	2.156
New Orleans-Metairie-Kenner, LA	29	2.162
Bridgeport-Stamford-Norwalk, CT	30	2.181
Cleveland-Elyria-Mentor, OH	31	2.235
Riverside-San Bernardino-Ontario, CA	32	2.257
San Antonio, TX	33	2.270
Pittsburgh, PA	34	2.276
Houston-Baytown-Sugar Land, TX	35	2.292
Virginia Beach-Norfolk-Newport News, VA-NC	36	2.340
Detroit-Warren-Livonia, MI	37	2.350
Albuquerque, NM	38	2.355
Allentown-Bethlehem-Easton, PA-NJ	39	2.364
Providence-New Bedford-Fall River, RI-MA	40	2.368
Hartford-West Hartford-East Hartford, CT	41	2.381
Denver-Aurora, CO	42	2.382
Charleston-North Charleston, SC	43	2.429
Milwaukee-Waukesha-West Allis, WI	44	2.436
Minneapolis-St. Paul-Bloomington, MN-WI	45	2.440
Springfield, MA	46	2.446
Tampa-St. Petersburg-Clearwater, FL	47	2.499
Baton Rouge, LA	48	2.511
Worcester, MA	49	2.517
Salt Lake City, UT	50	2.522

TABLE A2
Per capita Carbon Emissions from Transportation, 2005

Metropolitan Area	Highway Rank	Highway Total (metric tons)	Auto Rank	Auto (metric tons)	Truck Rank	Truck (metric tons)
New York-Northern New Jersey-Long Island, NY-NJ-PA	1	0.825	1	0.664	7	0.161
Honolulu, HI	2	0.847	3	0.786	1	0.061
Rochester, NY	3	0.950	7	0.812	2	0.138
Buffalo-Niagara Falls, NY	4	0.982	6	0.801	12	0.181
Los Angeles-Long Beach-Santa Ana, CA	5	1.022	17	0.882	3	0.139
Philadelphia-Camden-Wilmington, PA-NJ-DE-MD	6	1.023	5	0.789	22	0.234
Boston-Cambridge-Quincy, MA-NH	7	1.028	14	0.872	6	0.156
Lancaster, PA	8	1.030	2	0.767	29	0.263
Las Vegas-Paradise, NV	9	1.032	12	0.845	13	0.186
Portland-Vancouver-Beaverton, OR-WA	10	1.053	13	0.860	15	0.193
Boise City-Nampa, ID	11	1.059	10	0.830	20	0.229
Cleveland-Elyria-Mentor, OH	12	1.072	11	0.842	21	0.230
New Haven-Milford, CT	13	1.103	16	0.876	19	0.227
Colorado Springs, CO	14	1.109	21	0.937	9	0.172
Springfield, MA	15	1.114	23	0.948	8	0.166
El Paso, TX	16	1.129	9	0.830	39	0.300
Chicago-Naperville-Joliet, IL-IN-WI	17	1.132	8	0.820	41	0.312
Virginia Beach-Norfolk-Newport News, VA-NC	18	1.145	33	1.004	4	0.141
Greenville, SC	19	1.151	15	0.874	33	0.277
Washington-Arlington-Alexandria, DC-VA-MD-WV	20	1.157	30	0.984	10	0.173
New Orleans-Metairie-Kenner, LA	21	1.163	4	0.789	50	0.374
Providence-New Bedford-Fall River, RI-MA	22	1.168	37	1.014	5	0.154
San Jose-Sunnyvale-Santa Clara, CA	23	1.183	34	1.009	11	0.174
Pittsburgh, PA	24	1.185	19	0.913	32	0.272
Bridgeport-Stamford-Norwalk, CT	25	1.193	28	0.972	18	0.220
San Francisco-Oakland-Fremont, CA	26	1.195	32	0.998	16	0.197
Seattle-Tacoma-Bellevue, WA	27	1.200	24	0.955	25	0.245
San Antonio, TX	28	1.255	27	0.969	36	0.286
San Diego-Carlsbad-San Marcos, CA	29	1.270	48	1.078	14	0.192
Miami-Fort Lauderdale-Miami Beach, FL	30	1.295	42	1.031	30	0.264
Houston-Sugar Land-Baytown, TX	31	1.308	41	1.030	34	0.278
Hartford-West Hartford-East Hartford, CT	32	1.309	45	1.046	28	0.263
Poughkeepsie-Newburgh-Middletown, NY	32	1.309	35	1.010	37	0.299
Milwaukee-Waukesha-West Allis, WI	34	1.310	43	1.038	31	0.272
Dayton, OH	35	1.318	18	0.898	62	0.420
Allentown-Bethlehem-Easton, PA-NJ	36	1.337	26	0.964	49	0.373
Sacramento--Arden-Arcade--Roseville, CA	37	1.346	47	1.063	35	0.283
Minneapolis-St. Paul-Bloomington, MN-WI	37	1.346	50	1.090	27	0.256
Detroit-Warren-Livonia, MI	39	1.348	60	1.131	17	0.217
Baltimore-Towson, MD	40	1.355	44	1.044	40	0.311
Oxnard-Thousand Oaks-Ventura, CA	41	1.361	54	1.116	24	0.245
Wichita, KS	42	1.362	40	1.028	45	0.335
Denver-Aurora, CO	43	1.367	55	1.116	26	0.251
Akron, OH	44	1.371	39	1.023	48	0.348
Baton Rouge, LA	44	1.371	25	0.956	59	0.416
Tucson, AZ	46	1.394	20	0.924	74	0.470
Dallas-Fort Worth-Arlington, TX	47	1.406	49	1.081	43	0.325
Phoenix-Mesa-Scottsdale, AZ	48	1.414	22	0.940	77	0.474
Albuquerque, NM	49	1.431	31	0.990	67	0.442
Portland-South Portland-Biddeford, ME	50	1.443	51	1.097	47	0.346
Salt Lake City, UT	51	1.476	29	0.981	80	0.495
Worcester, MA	52	1.478	77	1.242	23	0.237
Tampa-St. Petersburg-Clearwater, FL	53	1.512	71	1.212	38	0.300
Austin-Round Rock, TX	54	1.518	57	1.119	54	0.398

TABLE A3
Per Capita Carbon Emissions from Residential Energy Use, 2005

Metropolitan Area	Rank	Residential Total (metric tons)	Residential Electricity (metric tons)	Other Residential Fuels (metric tons)
Bakersfield, CA	1	0.350	0.159	0.191
Seattle-Tacoma-Bellevue, WA	2	0.356	0.154	0.202
San Diego-Carlsbad-San Marcos, CA	3	0.360	0.157	0.202
Riverside-San Bernardino-Ontario, CA	4	0.372	0.184	0.188
San Jose-Sunnyvale-Santa Clara, CA	5	0.389	0.190	0.199
Fresno, CA	6	0.390	0.202	0.187
San Francisco-Oakland-Fremont, CA	6	0.390	0.176	0.215
Los Angeles-Long Beach-Santa Ana, CA	8	0.391	0.213	0.178
Portland-Vancouver-Beaverton, OR-WA	9	0.393	0.198	0.196
Stockton, CA	10	0.394	0.200	0.193
Oxnard-Thousand Oaks-Ventura, CA	10	0.394	0.189	0.205
Sacramento--Arden-Arcade--Roseville, CA	12	0.422	0.198	0.225
Boise City-Nampa, ID	13	0.447	0.143	0.304
El Paso, TX	14	0.483	0.364	0.119
Honolulu, HI	15	0.509	0.495	0.014
Tucson, AZ	16	0.606	0.509	0.097
Phoenix-Mesa-Scottsdale, AZ	17	0.658	0.570	0.087
New York-Northern New Jersey-Long Island, NY-NJ-PA	18	0.670	0.225	0.445
Greenville, SC	19	0.709	0.567	0.142
Columbia, SC	20	0.764	0.625	0.139
Trenton-Ewing, NJ	21	0.783	0.275	0.508
Charleston-North Charleston, SC	22	0.792	0.654	0.138
Poughkeepsie-Newburgh-Middletown, NY	23	0.824	0.313	0.511
Chicago-Naperville-Joliet, IL-IN-WI	24	0.833	0.374	0.459
Palm Bay-Melbourne-Titusville, FL	25	0.845	0.818	0.027
Miami-Fort Lauderdale-Miami Beach, FL	26	0.861	0.841	0.020
Orlando, FL	27	0.866	0.842	0.025
Albuquerque, NM	28	0.924	0.618	0.306
Cape Coral-Fort Myers, FL	29	0.932	0.906	0.026
Rochester, NY	30	0.958	0.384	0.574
Syracuse, NY	31	0.962	0.390	0.571
Albany-Schenectady-Troy, NY	32	0.966	0.381	0.584
Las Vegas-Paradise, NV	33	0.981	0.755	0.227
Houston-Baytown-Sugar Land, TX	34	0.983	0.858	0.125
Tampa-St. Petersburg-Clearwater, FL	35	0.988	0.961	0.026
Bridgeport-Stamford-Norwalk, CT	35	0.988	0.304	0.684
Jackson, MS	37	0.990	0.834	0.156
New Haven-Milford, CT	38	0.994	0.292	0.702
Boston-Cambridge-Quincy, MA-NH	39	0.996	0.412	0.584
New Orleans-Metairie-Kenner, LA	40	0.999	0.849	0.150
Detroit-Warren-Livonia, MI	41	1.002	0.385	0.617
Jacksonville, FL	42	1.003	0.979	0.024
Little Rock-North Little Rock, AR	43	1.010	0.803	0.207
Buffalo-Niagara Falls, NY	44	1.014	0.404	0.609
San Antonio, TX	45	1.015	0.880	0.135
Sarasota-Bradenton-Venice, FL	46	1.018	0.990	0.028
Denver-Aurora, CO	47	1.025	0.625	0.400
Colorado Springs, CO	47	1.025	0.620	0.405
Allentown-Bethlehem-Easton, PA-NJ	49	1.027	0.558	0.469
Charlotte-Gastonia-Concord, NC-SC	50	1.033	0.846	0.187
Worcester, MA	51	1.038	0.429	0.609
Raleigh-Cary, NC	52	1.041	0.859	0.182
Salt Lake City, UT	53	1.046	0.661	0.385